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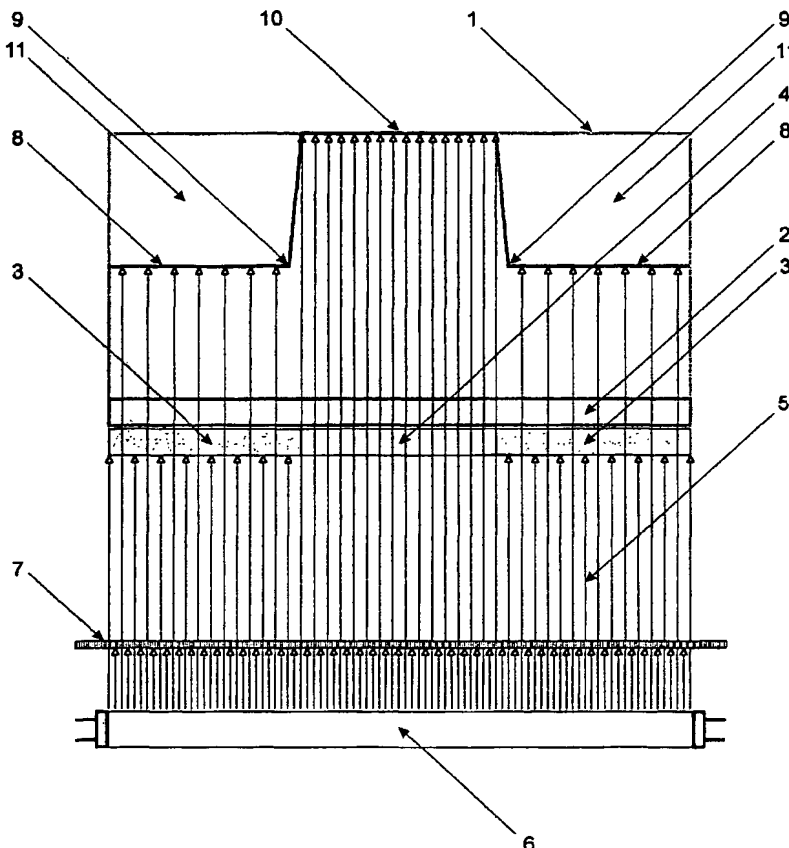
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- Declaration under Rule 4.17:**
— of inventorship (Rule 4.17(iv)) for US only

[Continued on next page]

(54) Title: STEREOFLEXOGRAPHY



(57) Abstract: Improvement to the photopolymers catalysis in printing plates for the flexographic and of stamp sectors (fig.1), by exposing the photopolymer plate (1), only, by the bottom face (2), to two different and simultaneous levels of radiation; a lower, to catalyze the base of the relief (8) and a maximum, to catalyze the printing relief (10), emitted by radiation device (5, 6), polarized by filter (7), which uses a negative film whose black area is replaced by halftone (3), thereby originating the low radiation level, and keeping its transparent area (4), thereby originating the maximum radiation level, thickening the base of the dot (9) and sharpening the top of the dot (10), thereby eliminating the 'dot droop' and the 'dot gain', respectively; or which uses optic semiconductors, which digitally modulate the radiation in a fixed way (fig.2) for the stamp sector, with DMD or LCD (1), and in a mobile way (fig.3), with DMD (1), for the flexographic sector.

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— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

"STEREOFLEXOGRAPHY"

This patent seeks to protect the catalysis process (cure) of plates for graphic printing formed by photopolymer, in either liquid or solid state, for the stamps and flexographic sectors, respectively.

The flexographic sector's origins date back to the ancient woodcuts, texts and images carving in wood plates, used in the first stamps for graphic printing. Today, flexography differs from stamps, only, in the higher resolution of its printing plates, which is necessary to allow us to define its screen printing ('CMYK' system), and is similar in the remaining of the making, including the generation of printing relief third dimension, which is not necessary in two-dimensional printing plates used in the off-set sector.

Now, an analogical flexographic plate, made up by solid photopolymer, anchored in a transparent laminated plastic, is processed on both sides, separately, in a space procedure, for exposure to a radiation that ranges from ultraviolet (UV) to the visible light. The entire area of the bottom face (back exposure), anchored in the transparent laminate is exposed to the radiation, thereby generating a base whose thickness is proportional to the exposition time. The upper face (main exposure), designed for graphic printing, are exposed, only, in which texts and images (screen printing CMYK), in a 'black and white' negative film, allow a passage, thereby generating a relief on that base, after the washing to remove the non-catalyzed portion. In the digital process, the negative film is replaced by a black pellicle, which is sensitive to the infrared laser, adhered to the upper face, thereby originating a flexographic digital plate.

The 'Stereoflexography' is an improvement in the photopolymer plates making process, either in liquid or solid state, processed by the action of two-dimensional analogical or digital emission devices, which emit radiations ranging from the visible to the invisible spectrum. It is characterized by the 'main exposure' and 'back exposure' of the photopolymer plate to the radiation, only, to the bottom face (2), thereby catalyzing the formation of both the relief base (8) and the printing relief (10), simultaneously, by the action of two different

radiation levels: a low, to generate the relief base (8) and a maximum, to generate the printing relief (10). The neologism 'Stereoflexography' is the most appropriate for this new process because it generates the third dimension in the photopolymer plate, resulting from adding the height of the relief base (8) to the height of the printing relief (10), thereby generating the relief that is necessary to the graphical printing of texts and image on a flat and flexible substance, starting from any two-dimensional (negative film, LCD or DMD) radiation emission device.

To facilitate the understanding of this process, see fig.1, shows an analogical two-dimensional emission device and a flexographic plate, formed by a 2 mm thick photopolymer, shown in a 30-time enlarged cross-section, in which both the upper face (1) and the bottom face (2) made up by a transparent laminated plastic. The emission device, in this case, is formed by a black and white negative film, in which the black area was replaced by a pre-established percentile (halftone) of grey (3), and having the transparent area (4) placed against the bottom face (2); and a flat UV light source (6), emitting its radiation (5), polarized by the filter (7). The black area of the negative film, replaced by the percentile of grey (3), will have the function of allowing the low radiation level to pass through, thereby creating the relief base (8); whilst the white area (transparent) (4) of the negative film, will have the function of allowing a passage for the maximum radiation level, thereby creating the dot relief (10), after the washing to remove the non-catalyzed portions (11). By establishing one single radiation exposure time, as necessary to form the printing relief (10), the percentile of grey will be altered, which will allow the, exact, amount of radiation to pass through to form the thickness that is adequate for the relief base (8), which will in turn be catalyzed (cured), simultaneously, with the printing relief.

CLAIMS

1) 'Stereoflexography', it is an improvement characterized by catalyzing (curing), liquid or solid, photopolymer plates, only, by the bottom face (2), with two different and simultaneous levels of radiation. A lower level, designed to catalyze the relief base (8) generation, replacing 'back exposure' by percentile of grey (halftone); and a maximum, designed to catalyze the printing relief (10) generation, replacing 'main exposure', creating the high relief third dimension, which is necessary for those photopolymer plates destined for the flexographic and stamp sectors; by applying the traditional analogical exposure equipment, based on photoliths, negative films and lamps; or processing digitally in emission devices, modulating the radiation in optic semiconductors, replacing photoliths and negative films by LCD (Liquid Crystal Diode) or DMD (Digital Mirror Device);

2) The improvement is characterized by speeding up the process and reducing production time, for prosecuting, only, by the bottom face (2) of the photopolymer plate;

3) The improvement is characterized by eliminating the 'dot gain' usually occurring in the flexographic plates, which is caused by the effects of the refraction and persistence of radiation inside the photopolymer, thickening the top (10) of the dot when the expositions to radiation is done by the upper face (1) (main exposure) and by the bottom face (2) (back exposure), thereby damaging the resolution in these plates. By applying the emission, only, on the bottom face (2), the effects of refraction and persistence of radiation are inverted, sharpening the top (10) of the dot, and consequently improving resolution in these plates;

4) The improvement is characterized by eliminating the 'dot droop' usually occurring in the flexographic plates, which is caused by the effects of the refraction and persistence of radiation inside the photopolymer, sharpening the base (9) of the dot and thickening the top (10) of the dot, when the expositions to radiation is

done by the upper face (1) (main exposure) and by the bottom face (2) (back exposure), thereby weakening plate structure and reducing the durability of these plates. By applying the emission, only, on the bottom face (2), the effects of refraction and persistence of radiation are inverted, thickening the base (9) of the dot and sharpening the top (10) of the dot, thereby reinforcing plate structure and increasing the durability of these plates;

5) Because 'Stereoflexography' solves problems as neatness which is caused by processing by both the upper face (main exposure) and the bottom face (back exposure), it will allow the development of new light and compact pieces of equipment to manufacture photopolymer plates in the stamp sector, characterized by a fixed device, see fig.2, which process digitally, modulating the radiation in optic semiconductors, type LCD (Liquid Crystal Diode) or DMD (Digital Mirror Device) (1), necessary to catalyze the photopolymer plate (2), thereby transferring text and image files (3), to generate of the printing relief (5), simultaneously, with the percentile of grey (halftone) (4) to generate the relief base (6), directly from the computer (7), discarding, in these two improvements, the use of negative films and their supplies.

6) The elimination of 'dot gain' and 'dot droop' provided by 'Stereoflexography' will guarantee great neatness and longer lifetime to the flexographic plates processed in the new equipment, which is characterized by a mobile device, see fig.3 (1), in shaft X (2) and shaft Y (3), parallel to the photopolymer plate (4), processing digitally, modulating the radiation in optic semiconductors, type LCD (Liquid Crystal Diode) or DMD (Digital Mirror Device), necessary to catalyze the photopolymer plate (4), thereby transferring screen printing ('CMYK' system) of the texts and images files, to generate of the printing relief (5), simultaneously, with the percentile of grey (halftone) to generate the relief base (6), directly from the computer, discarding, in these two improvements, the use of photoliths and negative films.

STEREOFLEXOGRAPHY

ABSTRACT OF THE DISCLOSURE

Improvement to the photopolymers catalysis in printing plates for the flexographic and of stamp sectors, by
5 exposing the photopolymer plate, only, by the bottom face, to two different and simultaneous levels of radiation; a lower, to catalyze the base of the relief and a maximum, to catalyze the printing relief, emitted by radiation device, polarized by filter, which uses negative film whose black
10 area is replaced by halftone, thereby originating the low radiation level, and keeping its transparent area, thereby originating the maximum radiation level, thickening the base of the dot and sharpening the top of the dot, thereby eliminating the 'dot droop' and the 'dot gain',
15 respectively; or which uses optic semiconductors, which digitally modulate the radiation in a fixed way for the stamp sector, with DMD or LCD, and in a mobile way, with DMD, for the flexographic sector.

fig. 1

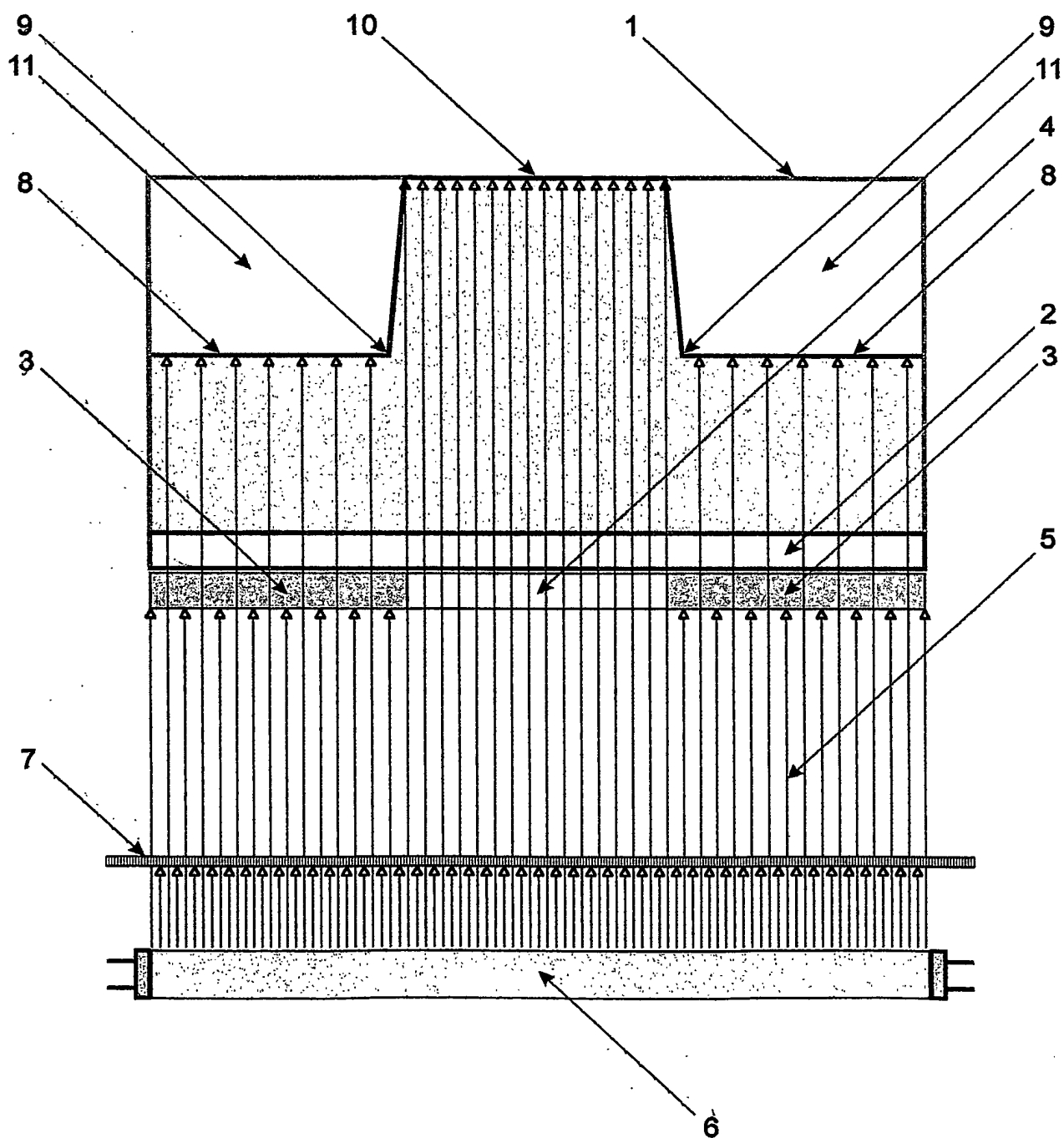


fig. 2

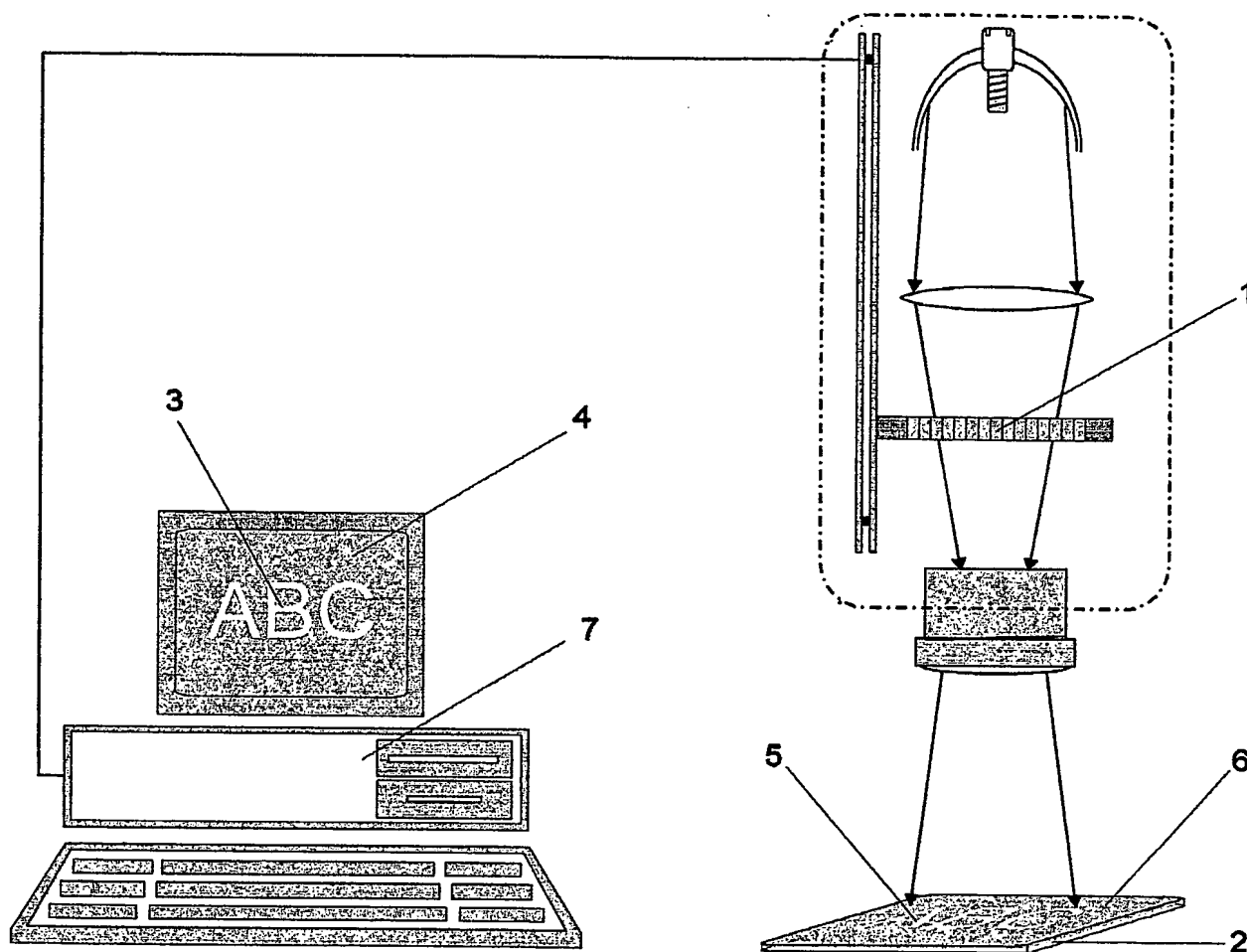
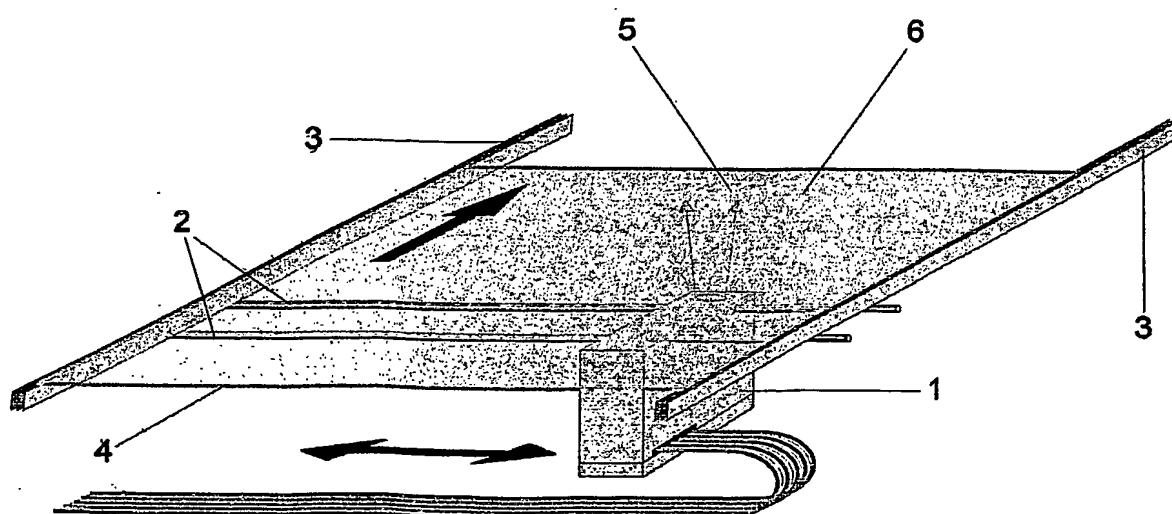


fig. 3



INTERNATIONAL SEARCH REPORT

International Classification No.
PCT/BR 00/00119-0

CLASSIFICATION OF SUBJECT MATTER

IPC⁷: G03C 1/76, B41M 5/40, G03F 7/095, B41N 1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷: B41M, B41N, G03C, G03F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6007967 A (KUMPFMILLER et al.) 28 December 1999 (28.12.99) <i>claims 1&12; examples 1-7.</i>	1,3
X	US 5552263 A (SCHOBER et al.) 3 September 1996 (03.09.96) <i>abstract; claim 1; example 1.</i>	1
X	WO 97/43696 A1 (NAPP SYSTEMS, INC.) 20 November 1997 (20.11.97) <i>claims 1,3,18,19&21.</i>	1
X	US 5330882 A (KAWAGUCHI et al.) 19 July 1994 (19.07.94) <i>claims 1&11.</i>	1

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

„A“ document defining the general state of the art which is not considered to be of particular relevance

„E“ earlier application or patent but published on or after the international filing date

„L“ document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

„O“ document referring to an oral disclosure, use, exhibition or other means

„P“ document published prior to the international filing date but later than the priority date claimed

„T“ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

„X“ document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

„Y“ document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

„&“ document member of the same patent family

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6 October 2003 (06.10.2003)

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Name and mailing address of the ISA/AT

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/BR 03/00119-0

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Claim 1 is referring to 'stereoflexography' which is an improvement by by catalyzing (curing), liquid or solid, photopolymer plates.

Claim 2 is referring to the improvement characterized by speeding up the process.

Claim 3 is referring to the improvement characterized by eliminating the "dot gain".

Claim 4 is referring to the improvement characterized by eliminating the "dot droop".

Claim 5 is referring to 'stereoflexography' because 'stereoflexography' solves problems as neatness.

Claim 6 is referring to the elemination of "dot gain" and "dot droop" provided by 'stereoflexography' guaranteed great neatness and longer lifetime to the flexographic plates processed by a new equipment.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on [redacted] family members

International application No.

PCT/[redacted]03/00119-0

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
US	A	5330882	1994-07-19	EP	A	0460919	1991-12-11
				CA	A	2043822	1991-12-06
				JP	A	4278955	1992-10-05
US	A	5552263	1996-09-03	DE	A	4007248	1991-09-12
US	A	6007967	1999-12-28	none			